

20. Alpha Construction Company has five crews. The skills of the crews differ from one another because of the difference in the composition of the crews. The company has five different projects on hand. The times (in days) taken by different crews to complete different projects are summarized in following table. Find the best assignment of the crews to different projects such that the total time taken to complete all the projects is minimized.

Projects execution times in days.

	Project				
	A	B	C	D	E
1	20	30	25	15	35
2	25	10	40	12	28
Crew 3	15	18	22	32	24
4	29	8	34	10	40
5	35	23	17	26	45

APRIL/MAY 2024

**CASC32/FASC32/BASC32 —  
QUANTITATIVE TECHNIQUES – I**

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define the term operation research.
2. Write any two applications of operations research.
3. Write the methods for the solution of a linear programming problem.
4. Write the characteristics of linear programming problem.
5. Define Big-M method/Penalty method.
6. Form the dual of the following problem.

$$\text{Maximize } Z = 4x_1 + 10x_2 + 25x_3$$

Subject to

$$2x_1 + 4x_2 + 8x_3 = 25$$

$$4x_1 + 9x_2 + 8x_3 = 30$$

$$6x_1 + 8x_2 + 2x_3 = 40$$

$$x_1, x_2 \text{ and } x_3 \geq 0.$$





14. (a) Find the initial basic feasible solution for the following transportation problem using North-West Corner Method.

Sources	Destination			Supply
	D1	D2	D3	
S1	3	8	5	7
S2	4	4	2	8
S3	6	5	8	10
S4	2	6	3	15
Demand	8	10	22	

Or

- (b) Obtain the initial basic feasible solution of the following TP using Least Cost Method.

Factory \ Store	A	B	C	Availability
P	10	8	8	8
Q	10	7	10	7
R	11	9	7	9
S	12	14	10	4
Requirement	10	10	8	

15. (a) A company has 4 machines to do 3 jobs. Each job can be assigned to only one machine. The cost of each job on each machine is given below. Determine the job assignments that will minimize the total cost.

	Job	Machine			
		W	X	Y	Z
	A	18	24	28	32
	B	8	13	17	18
	C	10	15	19	22

Or

- (b) Solve optimally the following assignment problem.

Mechanics		Job			
		I	II	III	IV
	A	42	35	28	21
	B	30	25	20	15
	C	30	25	20	15
	D	24	20	16	12